DAIKOWS 410

SAW

FERRITIC - MARTENSITIC STAINLESS STEEL
410

DESCRIPTION

Solid wire for 12% Cr martensitic stainless steels

This 12% Cr alloy is an air-hardening steel. Preheat and post weld heat treatments are required to achieve welds of adequate ductility for many engineering purposes. The most common application of filler metal of this type is for welding alloys of similar composition. It is also used for deposition of overlays on carbon steels to resist corrosion, erosion, or abrasion. Applications include reaction vessels, pipework in refineries, furnace parts, turbine parts, cast valves, etc. ...

SPECIFICATIONS

ISO 14343-A	S 13	AWS A5.9	ER410
DIN	-	Werkstoff Number	-
Certifications	-	Shielding	DAIKOFLUX 493-W
Positions	PA, PB, PC	Current	DC/AC

ASME QUALIFICATIONS

F-No (QW432)	6
A-No (QW442)	6

FERRITE

-

PREN

13.165

HARDNESS

230HV

CHEM. COMP. %

	DEFAULT
C	0.05
Mn	0.45
Ni	0.2
Cr	13
P	0.02
S	0.005
Mo	0.05
Si	0.3
Cu	0.1

MECHANICAL PROPERTIES

	MIN	VARIANT
Tensile strength R_m MPa	450	690
Yield strength $R_{p0.2}$ MPa	250	530
Elongation A (L_0=5d_0) %	15	22
Impact Charpy ISO-V	-	50J @ 20°C
Impact Charpy ISO-V	-	-

WELDING PARAMETERS

	2.4 mm
Ampere	250A - 420A
Voltage	28V - 32V
Packaging	Ø 2,0÷4,0mm
Packaging Type	K415 spool and drums.

ANTI-WEAR CHARACTERISTICS

Adhesive wear	▲▲▲△△
Abrasive wear	▲▲△△△
Impact	▲▲▲△△
Corrosion	▲▲△△△
Heat	▲▲▲△△

DAIKO®

410

DESCRIPTION

APPLICATION

Designed for welding martensitic 12%Cr (type 410) stainless steel, these consumables require tempering in suitable post-weld heat treatment (PWHT) to address challenges arising from high hardness (~450HV) and low ductility in the as-welded condition. Type 410, with precisely calibrated carbon content, undergoes air-hardening, resulting in a predominantly martensitic microstructure. Structural properties are constrained below ambient due to its relatively high ductile-brittle transition temperature, especially in weldments, and up to about 550ºC by modest creep resistance. It exhibits practical resistance to general corrosion, sulphide-induced stress corrosion cracking (SCC) in sour crude oil service, and oxidation up to about 800ºC. Applications include hydrocrackers, reaction vessels, distillation plants, pipework in refineries; furnace parts, linings; surfacing run-out rolls in steel mills; cast valve bodies, turbine parts, and burner nozzles.

ALLOY TYPE

12%Cr (410) martensitic stainless steel.

MICROSTRUCTURE

In the PWHT condition the microstructure consists of tempered martensite with some retained ferrite.

MATERIALS

EN W.Nr.: 1.4006 (X10Cr13), 1.4006 (G-X10Cr13), 1.4000 (X6Cr13), 1.4024 (X15Cr13).
ASTM: 410, 410S, 403, A487 gr. CA15.
UNS: S41008, S40300.

WELDING & PWHT

Preheating within the range of 150-250ºC becomes imperative for heavier sections. Subsequent to the welding process, it is essential to allow components to cool to room temperature before subjecting them to Post Weld Heat Treatment (PWHT). Both the weld metal and Heat-Affected Zones (HAZs) exhibit suboptimal ductility and toughness in the as-welded condition. Hence, careful handling is strongly advised before PWHT to minimize any potential physical shock. In the context of plain 410 welding, a typical industrial PWHT procedure involves a gradual cooling process to room temperature, allowing for complete transformation to occur (within the range of Ms-350ºC to Mf-100ºC). This is followed by tempering at temperatures between 680-760ºC, succeeded by air cooling. For the specific requirement of achieving hardness below 22HRC (NACE) in the weld area, a preferred PWHT temperature is 745ºC. Adhering to these prescribed steps ensures the desired mechanical properties and performance of the welded components.